AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. The following listing provides the amended claims with deleted material crossed out and new material underlined to show the changes made.

What is claimed is:

1. (Currently Amended) A fluorometer for measuring fluorescence of a non-solid material flowing through a system of pipes, the fluorometer comprising:

a) a housing having a distal end and having a shape adapted to insert into the system of pipes;

b) a light source for passing light through the distal end towards the non-solid material, wherein the light source is a light emitting diode; ~~and~~

c) a light detection circuit for receiving through the distal end light emitted from the non-solid material; and

d) wherein the fluorometer has threads for fastening the fluorometer to an adjoining member, wherein the adjoining member has corresponding threads.

2. (Original) The fluorometer of claim 1, wherein the distal end has a first orifice optically coupled to the light source, and a second orifice optically coupled to the light detection circuit.

3. (Original) The fluorometer of claim 2 further comprising first and second light-passing conduits respectively connected to the first and second orifices, wherein the first conduit optically couples to the light source, and the second conduit optically couples to the light detection circuit.

4. (Original) The fluorometer of claim 3, wherein the light-passing conduits are fiber

optic cables.

5. (Previously Presented) The fluorometer of claim 3, further comprising:

a) an excitation filter between the light source and the first orifice, said emission filter for filtering light outside of a first wavelength band; and

b) an emission filter between the second orifice and the light detection circuit, said emission filter for filtering light outside of a second wavelength band.

6. (Previously Presented) The fluorometer of claim 5, further comprising a chassis that aligns the light source, excitation filter, and the first light-passing conduit, and aligns the light detection circuit emission filter, and the second light-passing conduit.

7. (Original) The fluorometer of claim 2 further comprising at least one light-passing conduit connected to one of the orifices.

8. (Original) The fluorometer of claim 7, wherein the conduit optically couples the first orifice to the light source.

9. (Original) The fluorometer of claim 8, wherein the light detection circuit is positioned within the second orifice, wherein the second orifice is a chamber at the distal end, the second orifice having a distal end that faces outside of the fluorometer, wherein the distal end of the orifice is covered by a seal that allows light from the light source out of the fluorometer through the first orifice and light from the material into the fluorometer through the second orifice.

10. (Original) The fluorometer of claim 7, wherein the conduit optically couples the second orifice to the light detection circuit.

11. (Original) The fluorometer of claim 10, wherein the light source is positioned

within the first orifice, wherein the first orifice is a chamber at the distal end, the first orifice having a distal end that faces outside of the fluorometer, wherein the distal end of the orifice is covered by a seal that allows light from the light source out of the fluorometer through the first orifice and light from the material into the fluorometer through the second orifice.

12. (Currently Amended) The fluorometer of claim 2 ~~further comprising an adjoining member for inserting the fluorometer into the system of pipes~~, wherein the adjoining member ~~having~~ has a passageway that allows non-solid material to flow across the distal end of the fluorometer.

13. (Currently Amended) An apparatus for measuring fluorescence of a non-solid material that flows through two pipes, the apparatus comprising:

a) an adjoining member for connecting the first and second pipes, the adjoining member having a passageway that allows the non-solid material to flow from the first pipe to the second pipe, and the adjoining member further having a chamber that on a first end is open and at a second end terminates on the passageway; ~~and~~

b) a fluorometer for inserting into the chamber to measure the fluorescence of the non-solid material, wherein the fluorometer comprises a light emitting diode; and

c) wherein the fluorometer and the adjoining member have corresponding threads for fastening the fluorometer and the adjoining member together.

14. (Previously Presented) The apparatus of claim 13, wherein the fluorometer further comprises:

a) a housing having a distal end and having a shape adapted to insert into the system of pipes; and

b) a light detection circuit for receiving through the distal end light emitted

from the non-solid material,

wherein the light emitting diode passes light through the distal end towards the non-solid material.

15. (Original) The apparatus of claim 14 further comprising a fastening member for fastening the adjoining member and the fluorometer.

16. (Canceled)

17. (Previously Presented) An apparatus for measuring fluorescence of a non-solid material, the apparatus comprising:

a) two pipes through which the non-solid material flows;

b) an adjoining member that connects the two pipes, the adjoining member having a passageway that allows non-solid material to flow from one pipe to the other, and the adjoining member further having a chamber that on a first end is open and at a second end terminates on the passageway; and

c) a fluorometer inserted into the chamber for measuring the fluorescence of the non-solid material, wherein the fluorometer and the adjoining member have corresponding threads for fastening the fluorometer and the adjoining member together.

18. (Currently Amended) A fluorometer for measuring fluorescence of a non-solid material, the fluorometer comprising:

a) first and second orifices on a side of the fluorometer that is to be placed next to the non-solid material;

b) a light source for passing light through the first orifice and onto the non-solid material, wherein the light source is a light emitting diode; ~~and~~

c) a light detection circuit for receiving through the second orifice light

emitted from the non-solid material; and

d) a tube shaped housing shaped to insert into a system of pipes, wherein the tube shaped housing contains the light source, the light detection circuit, and a printed circuit board, wherein the printed circuit board contains electronic circuitry of the fluorometer.

19. (Original) The fluorometer of claim 18 further comprising first and second light-passing conduits respectively connected to the first and second orifices, wherein the first conduit couples to the light source, and the second conduit couples to the light detection circuit.

20. (Currently Amended) A method of measuring fluorescence of a non-solid material flowing through a system of pipes, the method comprising:

a) inserting the fluorometer into an adjoining member of the pipe system that connects two pipes in the system;

b) directing light from a light emitting diode in the fluorometer onto the non-solid material flowing between the two pipes;

c) collecting into the fluorometer the light emitted off the non-solid material; ~~and~~

d) based on the collected light, generating an electrical signal that is proportional to the fluorescence of the non-solid material; and

e) wherein the fluorometer and the adjoining member have corresponding threads for fastening the spectrometer and the adjoining member together.

21. (Original) The method of claim 20 further comprising fastening the fluorometer and adjoining member by using a material-tight seal.

22. (Original) The method of claim 20 further comprising calibrating the fluorometer before inserting the fluorometer into the pipe system, wherein calibrating the fluorometer

comprises:

placing the fluorometer in a first sample having a known first fluorescence value, performing said directing, collecting, and generating operations to compute a first electrical signal, and correlating the first electrical signal to the first fluorescence value;

placing the fluorometer in a second sample having a known second fluorescence value, performing said directing, collecting, and generating operations to compute a second electrical signal, and correlating the second electrical signal to the second fluorescence value.

23. (Currently Amended) A spectrometer for measuring light from a non-solid material flowing through a system of pipes, the spectrometer comprising:

a) a tube shaped housing having a distal end and having a shape adapted to insert into the system of pipes;

b) a light source for passing light through the distal end towards the non-solid material, wherein the light source is a light emitting diode; ~~and~~

c) a light detection circuit for receiving, through the distal end, light from the non-solid material; and

d) wherein the tube shaped housing contains the light source, the light detection circuit, and a printed circuit board, wherein the printed circuit board contains electronic circuitry of the spectrometer.

24. (Original) The spectrometer of claim 23, wherein the distal end has a first orifice optically coupled to the light source, and a second orifice optically coupled to the light detection circuit.

25. (Original) The spectrometer of claim 24 further comprising first and second light-passing conduits respectively connected to the first and second orifices, wherein the first conduit

optically couples to the light source, and the second conduit optically couples to the light detection circuit.

26. (Original) The spectrometer of claim 24 further comprising at least one light-passing conduit connected to one of the orifices.

27. (Original) The spectrometer of claim 26, wherein the conduit optically couples the first orifice to the light source.

28. (Original) The spectrometer of claim 27, wherein the light detection circuit is positioned within the second orifice, wherein the second orifice is a chamber at the distal end, the second orifice having a distal end that faces outside of the spectrometer, wherein the distal end of the orifice is covered by a seal that allows light from the light source out of the spectrometer through the first orifice and light from the material into the spectrometer through the second orifice.

29. (Original) The spectrometer of claim 26, wherein the conduit optically couples the second orifice to the light detection circuit.

30. (Original) The spectrometer of claim 29, wherein the light source is positioned within the first orifice, wherein the first orifice is a chamber at the distal end, the first orifice having a distal end that faces outside of the spectrometer, wherein the distal end of the orifice is covered by a seal that allows light from the light source out of the spectrometer through the first orifice and light from the material into the spectrometer through the second orifice.

31. (Original) The spectrometer of claim 23, wherein the spectrometer is a turbidimeter.

32. (Original) The spectrometer of claim 23, wherein the spectrometer is a

fluorometer.

33. (Currently Amended) An apparatus for measuring light from a non-solid material that flows through two pipes, the apparatus comprising:

a) an adjoining member for connecting the first and second pipes, the adjoining member having a passageway that allows the non-solid material to flow from the first pipe to the second pipe, and the adjoining member further having a chamber that on a first end is open and at a second end terminates on the passageway; ~~and~~

b) a spectrometer for inserting into the chamber to emit light towards the non-solid material and measure light from the non-solid material, wherein the spectrometer comprises a light emitting diode; and

c) wherein the spectrometer and the adjoining member have corresponding threads for fastening the spectrometer and the adjoining member together.

34. (Previously Presented) The apparatus of claim 33, wherein the spectrometer further comprises:

a) a housing having a distal end and having a shape adapted to insert into the system of pipes; and

b) a light detection circuit for receiving through the distal end light from the non-solid material,

wherein the light emitting diode passes light through the distal end towards the non-solid material.

35. (Original) The apparatus of claim 34 further comprising a fastening member for fastening the adjoining member and the spectrometer.

36. (Canceled)

37. (Previously Presented) A fluorometer for measuring fluorescence of a non-solid material flowing through a system of pipes, the fluorometer comprising:

a) a tube shaped housing having a distal end and having a shape adapted to insert into the system of pipes;

b) a light source for passing light through the distal end towards the non-solid material;

c) a light detection circuit for receiving through the distal end light emitted from the non-solid material, and

wherein the tube shaped housing contains the light source, the light detection circuitry, and a printed circuit board, wherein the printed circuit board contains electronic circuitry of the fluorometer.

38. (Previously Presented) The fluorometer of claim 37, wherein the tube shaped housing contains substantially all of the fluorometer.